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Dicofol, which is structurally similar to DDT, is a widely used organochlorine miticide applied principally to citrus and cotton in California, Arizona, Texas, and Florida, mostly as the product Kelthane.

This study was conducted first to learn more about the extent to which dicofol residues accumulate in lizard carcasses and in bird eggs in geographical areas where use is high, and then to evaluate possible population effects. We collected lizards for analysis in addition to bird eggs because lizard movements are much more restricted, potentially subjecting lizards to heavier and more continuous exposure. We also measured and evaluated DDT residues.

Lizards and bird eggs were collected in 1988 from citrus orchards in Texas (Cameron and Hidalgo Counties) and near cotton fields in California (Kings, Fresno and Kern Counties). Lizards were collected from citrus orchards in Florida (Polk County).

All samples were analyzed for dicofol and DDT residues at the Patuxent Environmental Science Center with a gas chromatograph (Hewlett Packard 5890 series II) using specially developed procedures. The limit of detection was 0.1 ppm.

The highest concentrations of dicofol residues previously reported in free-living wildlife were 1.8 ppm dicofol, 1.2 ppm dichlorobenzophenone (DCBP), and 1.5 ppm monodechlorinated dicofol (DCD) in an eastern screech-owl (*Otus asio*) egg from central Florida. Residues in the carcass of one Texas spotted whiptail (*Cnemidophorus gularis*; Table 1) exceeded the screech-owl dicofol value by 6:6 times and the DCD value by 10 times; amounts of DCBP were similar. Whether these maximum amounts of dicofol (12 ppm) and DCD (15 ppm) in the whiptail are enough individually or together to affect reproduction is not known. Although there was no overall effect on reproductive success, other researchers found that carcasses of eastern screech-owls that produced thin-shelled eggs contained 5.4–7.8 ppm dicofol and 3.4–6.6 ppm DCD. Because these amounts are less than those found in the most contaminated lizard carcass, effects on a lizard population might warrant investigation if such concentrations are common among many individuals.
All detectable residues are reported in Tables 1 and 2. California lizards (side-blotched lizard, *Uta stansburiana*; western fence lizard, *Sceloporus occidentalis*) and two species of Texas bird eggs (white-winged dove, *Zenaida asiatica*; white-tipped dove, *Leptotila verreauxi*) contained no residues of dicofol or DDT.

Factors that may have affected dicofol residue concentrations in Texas lizards (Table 1) are confounded but include orchard, location within orchard, and time between spray and collection. The three lizards containing the highest dicofol residues, however, were collected only 9 days after spraying. Bird eggs collected from Texas orchards about 6 weeks after spraying contained no dicofol residues. Among California bird eggs, only one egg collected on the day of spraying and adjacent to the sprayed field contained just a trace amount of dicofol. This egg may have been contaminated by pesticide drift. Other eggs with nearby sprays that occurred about 1 month before collection lacked

dicofol residues. The trace amount of dicofol in a green anole (*Anolis carolinensis*) from a Florida orchard (Table 1) suggested persistence of almost a year. In general, it seems that relatively high dicofol residues may accumulate, at least in lizards, but dissipate rapidly. Rapid dissipation would reduce the likelihood of chronic effects; however, the high dicofol residues observed in Texas whiptail lizards in June occurred during the reproductive season, as evidenced by three females with enlarged ovarian follicles or oviductal eggs.

Maximum DDE concentrations in some species—6.9 ppm in a northern harrier egg (*Circus cyaneus*) and 9.6 ppm and 7.7 ppm each in black-necked stilt eggs (*Himantopus mexicanus*) from California, and 15 ppm in a great-tailed grackle egg (*Quiscalus mexicanus*) from Texas (Table 2)—are as high or higher than mean concentrations that impaired reproduction in such species as the bald eagle (*Haliaeetus leucocephalus*), black-crowned night-heron (*Nycticorax nycticorax*) and white-faced ibis (*Plegadis chihi*). DDE was low (Table 2) in American avocet (*Recurvirostra americana*), American bittern (*Botaurus lentiginosus*), killdeer (*Charadrius vociferus*), cinnamon teal (*Anas cyanoptera*), and mallard (*A. platyrhynchos*). There are no data for lizards with which to compare the extreme value of 9.6 ppm found in a six-lined racerunner (*Cnemidophorus sexlineatus*) from Florida (Table 1). Possible effects of DDE on populations of these bird and lizard species are unknown.

Lack of both DDE and dicofol residues in California lizards may result only because they were collected from soil near, but not in, cotton fields where neither DDT nor dicofol had ever been applied, whereas Florida and Texas lizards were collected in or on the edge of orchards and probably had lived their entire lives on soil formerly treated with DDT and more recently with dicofol. It is worth investigating whether lizards present under these conditions are genetically resistant to the effects of DDE or dicofol or both. Resistance to DDT residues has long been known in populations of fish and frogs. Resistance in groups with a cleidoic egg, such as oviparous lizards, oviparous snakes, turtles, crocodilians, or birds, however, has not been reported.

Our data should alert managers in areas of dicofol use to possible food-chain concentration and reproductive effects, especially in reptiles. We also emphasize the continuing lack of appropriate data for birds. Future sampling should concentrate on predaceous bird species likely to feed within treated agricultural habitats. Collection of eggs for analysis should begin within days after spray application.

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